INDOOR AIR QUALITY AND VAPOR INTRUSION ASSESSMENT SCOPE OF WORK REVISION 2

UniFirst Property
Wells G&H Superfund Site
Woburn, Massachusetts

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Submitted To:
United States Environmental Protection Agency
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1.0 INTRODUCTION

This Revised Indoor Air Quality and Vapor Intrusion Assessment Scope of Work (IAQA/VI SOW) has been prepared on behalf of UniFirst Corporation (UniFirst) by The Johnson Company, Inc. (The Johnson Company) for submittal to the United States Environmental Protection Agency Region 1 (USEPA). This Revised IAQA/VI SOW addresses comments provided by the USEPA in a letter dated December 18, 2009 (December Comment Letter) regarding the IAQA/VI SOW submitted to the USEPA on October 9, 2009, subsequent additional comments made during discussions between USEPA and UniFirst in a January 21, 2010 meeting, and comments provided by the USEPA in a letter dated February 25, 2010 (February Comment Letter) regarding the Revised IAQA/VI SOW submitted to the USEPA on February 17, 2010. This SOW documents the scope and methods of the planned indoor air quality and vapor intrusion assessment at the UniFirst Property located in Woburn, Massachusetts, herein referred to as "the Property" (Figure 1). This IAQA/VI work is being conducted to address concerns expressed by the USEPA in its May 14, 2009 draft *Comments on OU-1 UniFirst Remedial Action Reports* letter regarding potential vapor intrusion risks at the on-Property building, based on calculations performed by the USEPA using historical soil and soil vapor samples collected under the existing building and presented in the May 14, 2009 draft letter.

2.0 PROPERTY DESCRIPTION

The Property is located at 15 Olympia Avenue in Woburn, Massachusetts and consists of approximately 3 acres zoned as "Industrial Park (I-P)." The chronology of building construction at the Property has been documented previously in numerous reports, including the *Summary of Unconsolidated-Deposits Investigations at the UniFirst Property, Woburn, Massachusetts* report (Unconsolidated Deposits Report) (Applied Groundwater Research, Ltd. and Environmental Project Control, Inc., 1994) and, more recently, in a letter from Harvard Project Services LLC to Joseph LeMay dated January 8, 2010 (HPS Letter).

The Property was undeveloped until 1965. Structures subsequently constructed on the property include Building A, constructed in November 1965, and two building additions:

Building B added in 1966 and Building C added in 1978 (Figure 2). In the late 1970s, the loading dock at the east end of the Property was upgraded and enclosed. All portions of the current building are slab-on-grade construction with concrete block walls. The current single story building encloses approximately 57,000 square feet (ft^2).

Since 1989, most of the building on the Property has been leased to Extra Space Storage, formerly known as Woburn Storage Depot. The leased space has been converted into storage units that are subleased individually to customers, and a small administration office located in the south central area of the building. The current building configuration is shown on Figure 3. UniFirst continues to use the northeast corner of the building for housing and operation of the groundwater treatment plant, which is part of UniFirst's groundwater remedial action. Employees of Extra Space Storage work at the Property on a daily basis, primarily in the administration office (Figure 3). The building is staffed and accessible to Extra Space Storage customers approximately nine and a half hours a day from Monday through Saturday, and four hours on Sunday.

Subsurface geologic and hydrogeologic conditions have been thoroughly characterized. Results of the many investigations undertaken at the Property are reported, for example, in six unconsolidated deposits-specific reports and nine Wells G&H Site reports, all listed in the Unconsolidated Deposits Report. Unconsolidated-deposits investigations previously undertaken at the Property have included: logging and soil sampling from 32 borings and 13 test pits; installation of 14 soil vapor probes, 7 vapor monitoring wells, and 21 groundwater monitoring wells; chemical analysis of 140 unconsolidated deposit soil samples and more than 570 groundwater samples; characterization of approximately 60 soil samples for grain size, moisture content, carbon content, and other physical properties; petroleum hydrocarbon characterization of 29 unconsolidated deposit samples and bituminous-concrete pavement samples; and chemical analysis of approximately 30 soil vapor samples.

The Property is underlain by unconsolidated soils that consist of till and overlying native and non-native fill. The total thickness of unconsolidated deposits varies considerably across the property (Appendix A). Beneath the northeast portion of the building, only a few feet (i.e., less

than three feet at Test Pit E) of unconsolidated deposits are present above the underlying bedrock. This bedrock surface drops off to the west, and the unconsolidated deposits are at their thickest (approximately 55 to 65 feet) beneath the western portion of the building. Fill at the Property is generally described as a tan to brown sand and gravel with a minor silt-sized fraction. The contact of the fill with the underlying till is difficult to distinguish, likely because much of the fill was derived from similar on-Property or local deposits. Beneath the eastern portion of the building, the till is referred to as an "ablation till" and consists of a poorly-sorted mixture of silt, sand, and gravel with boulders common. Locally (e.g., at UC8), an approximately 1.5-foot thick "lodgement till" has been logged beneath the ablation till and above the bedrock. The lodgement till is dense and has a coarse to fine sand and gravel grain size distribution with little silt. Based on test pits and boring logs, the lodgement till is not consistently present between the ablation till and bedrock.

Ongoing groundwater extraction from extraction well UC22 (Figure 1) has lowered the groundwater table across the Property, and unconsolidated deposits underlying the eastern end of the building remain unsaturated throughout the year (Appendix A). The water table in the unconsolidated deposits is generally encountered at approximately 10 feet below ground surface (bgs) under and adjacent to the central and western portion of the building. Additional geologic and hydrogeologic details for the unconsolidated soils underlying the on-Property building were presented in the Unconsolidated Deposits Report.

3.0 PROPERTY BACKGROUND

The Property was initially developed in 1965 with the construction of Building A. This building and the Property were initially leased by Interstate Uniform Service Corporation (IUS). IUS changed its corporate name to UniFirst Corporation in 1986 and took title to the Property that same year. Building B was constructed in 1966, and Building C was constructed in 1978. In the late 1970s, IUS completed the last major structural modification to the building by upgrading the loading dock at the east end of the Property. The former ramped-down, at-grade dock was elevated and enclosed. Beginning in 1989, UniFirst leased the property to Woburn Storage Depot, Inc., which has since been purchased by Extra Space Storage Inc. In addition to

housing UniFirst's groundwater treatment system, since 1989 the building has been used as a public storage facility where lockers of various sizes are available for rent.

The operating history of the Property has been well documented in reports prepared for both USEPA and UniFirst. These include the Unconsolidated Deposits Report, the *Wells G and H Remedial Investigation, Part II, Final Report* prepared for USEPA (Alliance Technologies Corporation, 1986) and, most recently, the HPS Letter. A summary of the Property operational history is presented below.

The Property was acquired by B&S Realty Trust and leased to IUS in 1965. During the period shortly before B&S Realty Trust acquired and developed the Property, historical aerial photographs show significant surface disturbance on the Property consistent with excavation, debris piling, and surface staining. In particular, an aerial photograph taken in 1964 shows what appears to be soil-stained areas emanating from the northeast corner of the Property to the south and west, across the area over which the eastern portion of the existing building (i.e., Building B) was subsequently constructed. During Property investigations, this stained area was found to coincide with a waste-oil disposal area identified during trenching activities associated with installation of the UniFirst treatment system in 1992. Additional detail, including the 1964 aerial photograph, was presented in the November 1992 Pre-Design Work Plan (Water Waste & Land, Inc. et al., 1992) and the Unconsolidated Deposits Report.

Building A was built in 1965. Building A was used for garment storage and office space. Building B was constructed in 1966. For a short time, between 1967 and 1969, IUS operated a "white shirt laundry" in Building B. This operation consisted of one dry-cleaning machine and several conventional washing machines. During the two years that the white shirt laundry operated, diatomaceous earth was used to filter tetrachloroethene (PCE) for reuse in the dry-cleaning machine. The used diatomaceous earth was put into drums for transport to a municipal landfill or placement in a facility dumpster that was subsequently offloaded by a commercial refuse hauler. There is neither historical evidence nor any data indicating that any diatomaceous earth was disposed of at the Property. All of the operations that IUS or UniFirst conducted on

the Property that involved use or storage of PCE occurred after Building A and Building B were constructed.

Between 1977 and 1982, IUS maintained a 5000-gallon indoor storage tank that was supported on two steel cradles above the floor at the east end of Building B (Figure 2). The fill pipe for the tank was located outside the building, within the former at-grade loading dock at the east end of the building. The tank was used principally to store PCE for occasional distribution to IUS branch operations. Small quantities of less than 50 gallons at a time were reportedly pumped off for distribution to other locations. One load of 1,1,1-trichloroethane (TCA) also was reportedly delivered to the tank. In late 1979, a spill of approximately 100 gallons of PCE occurred inside Building B; the spill was reportedly noticed and cleaned up within an hour. No floor drains or weep holes existed in this portion of the building. The solvent storage tank was permanently removed from the Property in late 1982 or early 1983.

Environmental investigations commenced at the Property in 1983. Based on data from these investigations, as summarized in Section 2.0, a detailed conceptual model has been developed and used for the nature and extent of PCE contamination in the unconsolidated deposits at the Property. The investigations identified two areas at the Property where chlorinated solvents were apparently released to the ground surface: a waste-oil contamination area and an area to the south of the current loading dock. Investigation results showed that within the unconsolidated deposits these two release areas were limited in lateral extent (approximately 525 ft^2 and 700 ft^2, respectively), and evidence of residual dense nonaqueous phase liquid (DNAPL) was implied from concentrations detected in soil samples in small discontinuous zones within each area. PCE DNAPL is believed to have migrated predominantly downward with limited lateral spreading through the relatively thin (a few feet thick) unconsolidated deposits in these areas to the underlying bedrock. A substantial portion of the contaminated soils (approximately 60%) is believed to have been removed during excavation of an influent line trench and test pits between 1992 and 1994. A zone of low to moderate PCE soil concentrations extending southwestward from the east end of the Property (approximately 1300

ft^2 in area) was identified and attributed to vapor migration upward from contaminated groundwater.

Indoor air data measurements were collected inside the Property building in 1989. The risk assessment provided to USEPA for exposures within the building based on those indoor air data measurements concluded that there were no unacceptable risk levels within the building (Unconsolidated Deposits Report, pp 3-4 to 3-5). On May 14, 2009, however, USEPA provided UniFirst with draft *Comments on OU-1 UniFirst Remedial Action Reports* in which USEPA requested a work plan to re-evaluate potential vapor intrusion risks at the Property, based on calculations performed by the USEPA using historical soil and soil vapor samples collected under the existing building.

In discussions with USEPA concerning its Comments, UniFirst agreed to submit this SOW to collect sub-slab soil vapor and indoor air data sufficient to evaluate both indoor air quality and the potential for sub-slab vapor to present an indoor air risk in the existing building, and to collect shallow groundwater data to evaluate shallow groundwater VOC concentrations at the water table beneath the Property. This Revised SOW presents a work plan and associated Quality Assurance Project Plan (QAPP) for collection of sub-slab soil vapor, indoor air, and ambient outdoor air samples to assess vapor intrusion and indoor air quality within the existing building on the Property. UniFirst also intends to collect shallow groundwater data to evaluate shallow groundwater VOC concentrations at the water table using existing, useable on-Property water-table monitoring wells. As agreed at the January 21, 2010 meeting between USEPA, UniFirst, and W.R. Grace & Co. – Conn (W.R. Grace), W.R. Grace and UniFirst will develop a separate Revised *Vapor Intrusion Assessment Work Plan* (Revised VIA Work Plan) and associated QAPP for groundwater sampling, which will then be followed for sampling and laboratory analysis of groundwater from both on-Property monitoring wells and additional off-Property water-table wells. This Revised VIA Work Plan and associated QAPP will be submitted to the USEPA under separate cover.

4.0 SCOPE OF WORK OBJECTIVES

The objectives of this IAQA/VI SOW are to:

- evaluate the potential for sub-slab vapors to present an indoor air risk in the on-Property building;
- determine if vapor intrusion exposure pathways exist;
- collect sufficient data to evaluate any complete exposure pathways to commercial workers; and
- use the data collected during this IAQA/VI to determine what, if any, mitigation measures may be appropriate.

Based on these objectives, the following SOW has been prepared to provide the data necessary to evaluate the potential for sub-slab vapors to present an indoor air risk to commercial workers in the building and to determine if an impact to indoor air quality from potential vapor intrusion exists. USEPA guidance recommends sampling of sub-slab or crawl space vapor concentrations and/or sampling of indoor air concentrations as the top tier (Tier 3) for site-specific evaluation of vapor intrusion to indoor air (USEPA, 2002). This SOW proposes both sub-slab vapor and indoor air sampling to meet the IAQA/VI objectives. Sampling protocols and methods are described below and in the attached QAPP and Standard Operating Protocols (SOPs). In response to comments from USEPA during meetings held on September 14, 2009 and January 21, 2010, in which this SOW was discussed, this SOW also proposes sampling of existing shallow water-table monitoring wells on the Property, to be conducted concurrently with sampling of the off-Property shallow groundwater monitoring wells under the Revised VIA Work Plan and associated QAPP to be submitted under separate cover.

5.0 SCOPE OF WORK SAMPLING PROTOCOLS AND METHODS

To assess both the indoor air quality and the potential for vapor intrusion from sub-slab vapors, The Johnson Company proposes to collect indoor ambient air and sub-slab vapor samples in and below the on-Property building. The collection of the samples concurrently (i.e., during a single sampling event where 8-hour indoor air samples are collected first and sub-slab samples are collected subsequently) from co-located sample locations will allow for the direct correlation between sub-slab impacts and ambient air conditions. Building pressurization and

ambient barometric conditions will be monitored throughout the sampling event. Exterior ambient air samples also will be collected for purposes of correlating outdoor and indoor air quality conditions. The collection of these data will provide the information necessary to meet the objectives of this IAQA/VI SOW.

The predominant chemicals previously detected in soil vapor, soil, and/or groundwater samples collected from unconsolidated deposits are PCE, trichloroethene (TCE), and TCA. Only PCE, TCE, and their breakdown product 1,2-dichloroethene (1,2-DCE) have been detected in soil vapor samples. The apparent and presumed primary sources of these contaminants were the two identified solvent release areas. PCE and TCE degradation product vinyl chloride and TCA degradation product 1,1-dichloroethene also have been detected in groundwater samples from the Property.

Through the review of groundwater data, The Johnson Company derived a proposed analyte list for this IAQA/VI SOW. This list included contaminant compounds that are considered to be volatile (per 40 CFR Part 51.100) and have been detected in environmental samples collected on the Property. Chemicals that are degradation products of PCE and TCA were also included in the proposed analyte list. Vinyl chloride was included in the analyte list because it was identified as a compound of concern (COC) in the Record of Decision (ROD), but it was not previously detected in soil vapor samples collected at the Property. As requested in the December and February Comment Letters, however, additional analytes, including air phase petroleum hydrocarbons, have been added for this Revised IAQA/VI SOW. The revised chemical analyte list is presented in Table 1, along with the laboratory analytical method and target reporting limit for each constituent.

The storage facility is staffed and open to the public between 8:00 AM and 5:30 PM Monday through Saturday, and 10 AM to 2 PM on Sunday. Ambient air and sub-slab vapor samples will be collected after the building has been closed for at least 4 hours (i.e., on a Sunday evening) to the extent possible to avoid or minimize interference with the public and reduce the potential for outdoor air to impact indoor air sampling locations. To the extent possible, building windows and doors will be kept closed during sample collection. During the winter heating

season, the building is heated using approximately 12 ceiling-suspended thermostat-controlled natural gas heaters. Based on our current knowledge, the building does not have an air cooling or ventilation system.

Co-located sub-slab vapor monitoring and indoor ambient air sample locations were located in a grid to provide comprehensive coverage. Sampling locations also took into consideration:

- several previous data sets from the Property in which areas of elevated subsurface contamination were identified beneath the eastern and south central areas of the building;
- practical access constraints (i.e., storage unit areas are not readily accessible for sample collection);
- comments provided by USEPA in the December Comment Letter and at the January 21, 2010 meeting;
- the pre-sampling visual building inspection and photoionization detector (PID) screening conducted on February 17, 2010;
- the pre-sampling PID screening conducted on March 15, 2010 with USEPA contractor and MassDEP representatives; and
- the "EPA revised UniFirst VI Sampling Location figure 03-24-10" transmitted to UniFirst by USEPA in an email dated March 24, 2010.

The overall sampling program will include:

- two visual building inspections and a pre-sampling PID screening of readily accessible areas of the on-Property building (i.e., all proposed sampling locations, corridors, office space, bathrooms, and the treatment facility "pump room"), cracks between floors and walls and other significant floor cracks, if any, that are visible in readily accessible areas of the building to identify and document any conditions that could interfere with the indoor air sampling results;
- installation of 15 sub-slab vapor monitoring points (SV-01 through SV-15), including two locations in the office area of the building and one location in the treatment facility "pump room";
- collection of indoor ambient air samples adjacent to each sub-slab monitoring point; and
- collection of exterior ambient air samples at three locations (OA-01 through OA-03), to be determined on the day of sample collection.

Approximate locations for the co-located sub-slab and indoor air monitoring points, established as a result of the pre-sampling inspections, discussions with USEPA and its

contractor, and "EPA revised UniFirst VI Sampling Location figure 03-24-10" transmitted to UniFirst by USEPA in an email dated March 24, 2010, are presented on Figure 4. Note that the sub-slab vapor/indoor air sample locations are approximate and may be adjusted following field review. Installation protocols and sample collection methods are detailed in the following sections and attached QAPP. Data validation procedures are detailed in Section 6.0.

As part of the separate VIA, UniFirst also proposes to collect shallow groundwater samples from the 22 existing on-Property water-table monitoring wells shown on Figure 4, to the extent such wells are useable and sufficient groundwater volume is available for sampling, to evaluate shallow groundwater VOC concentrations at the water table. Wells identified as non-sampleable, if any, will be identified to the USEPA following integrity testing, but will not be restored. Sampling of on-Property water-table monitoring wells will be conducted concurrently with sampling of the off-Property shallow groundwater monitoring wells under the Revised VIA Work Plan and associated QAPP to be submitted under separate cover. A tabular summary of well details, including measuring point elevation, screen interval elevations, formation screened, and the April 2009 measured groundwater elevation, is presented in Table 2.

Pre-Sampling Activities

Prior to conducting the IAQA/VI sampling, The Johnson Company performed two visual building inspections and PID screenings of readily accessible areas of the on-Property building (i.e., all proposed sampling locations, corridors, office space, bathrooms, and the treatment facility "pump room") to identify and document any conditions that could interfere with the indoor air sampling results. The Johnson Company did not enter individual storage units rented to storage facility customers. An interview was conducted with the worker at the Property who had the most knowledge of storage practices. The first inspection and PID screening was performed on February 18, 2010 to allow sufficient notice and discussions of findings with USEPA regarding potential adjustments to sample locations, if any. Locations were adjusted but not expanded. USEPA was notified of the second building inspection and PID screening schedule at least one week prior to inspection. The second building inspection and PID screening was conducted on March 15, 2010 with USEPA contractor and MassDEP representatives. The Johnson Company performed a PID screening of cracks between floors and

walls and other significant floor cracks that were visible in readily accessible areas of the building to identify and control, if possible, any sources of chemicals that may affect indoor air sample collection. All chemicals that can be removed from the building will be removed prior to conducting the IAQA/VI sampling. Individual storage units rented to storage facility customers were not entered for inspection and may house chemicals of concern. If high PID readings were noted near any closed storage units, the condition was documented to identify and control, if possible, the potential to interfere with the indoor air sampling results and evaluate potential adjustments to sample locations. JCO-SOP-044 for calibration and operation of the miniRae 3000 PID is provided with the attached QAPP.

Indoor Ambient Air Assessment

The indoor ambient air samples will be collected within the on-Property building co-located with the sub-slab monitoring locations (see Figure 4, SV-01 through SV-15). JCO-SOP-063 for conducting indoor air sampling is provided with the attached QAPP.

Sample locations will be elevated off the floor level to a representative breathing zone exposure height. The samples will be collected into individually-certified clean evacuated 6-Liter passivated canisters (SUMMA® or fused silica lined) provided with pre-calibrated flow controller by Alpha Analytical, Inc. of Mansfield, Massachusetts (Alpha), a National Environmental Laboratory Accreditation Conference (NELAC) (E87814) certified laboratory. Canister sampling will be conducted using USEPA Region 1 ECASOP-Canister Sampling SOP4 (08/31/07) and ASTM D5466-01 as guidance. Samples will be collected over an 8-hour period at a target sampling rate of approximately 10 milliliters per minute (mL/min). The sample canister will be closed when it reaches a target final vacuum reading (typically 2 to 10 inches of mercury, to maintain a negative pressure in the canister following sample collection) rather than after a specified sample collection period.

Field replicate (or duplicate) samples will be collected at two sample locations for data validation purposes. Field replicates will be collected simultaneously by placing two 6-Liter passivated canisters (SUMMA® or fused silica lined) side-by-side to allow collection of an

ambient air sample in two sample canisters at once by opening and closing both flow controllers at the same time.

Samples will be analyzed by Alpha for the analytes listed in Table 1. Samples will be analyzed using Modified EPA Method TO-15 with Selective Ion Monitoring (SIM) and Massachusetts Air-Phase Petroleum Hydrocarbons (MA APH) Method as noted in Table 1, with the target reporting limits shown in Table 1.

Outdoor Ambient Air Assessment

The outdoor ambient air samples will be collected based on the predominant wind direction during the day of sampling. Procedures described in JCO-SOP-063 for conducting indoor air sampling will be used for collection of the outdoor ambient air samples. On the day of sampling, the forecasted wind direction will be recorded and a handheld digital anemometer (Speedtech Instruments WindMate 300 or equivalent) with wind direction capability will be used to verify wind direction at each outdoor air sampling location. One downwind and two upwind locations will be monitored over a 30-minute interval to select the most appropriate sampling locations. Wind direction will be logged at the beginning and end of sample collection at each outdoor sampling location.

One sample will be located downwind of the facility and two samples will be collected upwind of the facility (OA-01 through OA-03). Sample locations will be elevated off the ground surface to a representative breathing zone exposure height. Samples will be collected into individually-certified clean evacuated 6-Liter passivated canisters (SUMMA® or fused silica lined) provided with pre-calibrated flow controller by Alpha. Canister sampling will be conducted using USEPA Region 1 ECASOP-Canister Sampling SOP4 (08/31/07) and ASTM D5466-01 as guidance. Samples will be collected over an 8-hour period at a target sampling rate of approximately 10 mL/min to correspond with the indoor ambient air sampling interval.

Prior to the collection of the outdoor ambient air samples, the locations will be pre-screened with a PID to identify and remove any sources of chemicals that may interfere with the

outdoor air sample collection. In addition, the sample locations will be situated away from potential interfering sources of chemicals.

Samples will be analyzed by Alpha for the analytes listed in Table 1. Samples will be analyzed using Modified EPA Method TO-15 SIM and MA APH Method as noted in Table 1, with the target reporting limits shown in Table 1.

Sub-Slab Vapor Assessment

Assessment of the building construction has been completed. This assessment included both the visual inspection of cracks or other slab penetrations and the screening of penetrations with a PID by The Johnson Company on February 18, 2010. Based on this assessment, a follow-up visual inspection and PID screening conducted on March 15, 2010 with USEPA contractor and MassDEP representatives , and comments provided by USEPA in a March 24, 2010 email, some sample locations have been adjusted; these adjustments are reflected on Figure 4.

Facility representatives will review the locations for any subsurface utilities or other restricted drilling areas, and final locations will be adjusted as necessary. JCO-SOP-062 for conducting soil vapor sampling is provided with the attached QAPP. The SOP describes installation procedures for sub-slab vapor monitoring points, integrity testing, and sample collection procedures. Sub-slab vapor monitoring points will be installed within the building slab after a hole is drilled through the slab to the underlying media, similar to the sub-slab probe installation methodology described in *Assessment of Vapor Intrusion in Homes Near the Raymark Superfund Site Using Basement and Sub-Slab Air Samples* (USEPA, 2006). A schematic of a typical sub-slab vapor monitoring point is provided in JCO-SOP-062. JCO-SOP-062 describes the procedure for creating a seal between the outer and inner holes used for installation of the sampling probes to prevent indoor air from diluting the sub-slab vapor sample. Virginia Kmp PP-22 Sealing Gum, a product appropriate for soil vapor sampling applications (New York State Department of Health, Guidance for Evaluating Soil Vapor Intrusion in the State of New York, October 2006), or the equivalent will be used to create an ambient air-tight seal. All monitoring points will be purged and integrity tested prior to sampling. Purging of the probes will consist of the removal of three to five internal volumes of the probe and dedicated

tubing. Integrity testing will be conducted through the use of a tracer gas (e.g., helium) test. The monitoring points will be isolated from indoor ambient air, and the tracer gas will be introduced into an enclosure surrounding the monitoring point while ambient air is vented from the enclosure. A portable handheld meter will be used to determine the concentration of the tracer gas within the enclosure. The sub-slab vapor monitoring points will then be tested for the presence of the tracer gas. A positive indication of the tracer gas will be determined if the concentration from the probe is greater than one percent (1%) of the concentration within the enclosure. If concentrations are detected in excess of 1%, the monitoring point will be resealed and re-tested.

Sub-slab vapor samples (SV-01 through SV-15) will be collected within the building from the approximate locations presented on Figure 4. Sample locations may be adjusted following field review by representatives of UniFirst and/or The Johnson Company with respect to subsurface utilities and /or practical access limitations. The samples will be collected into individually-certified clean evacuated 6-Liter passivated canisters (SUMMA® or fused silica lined) provided with pre-calibrated flow controllers by Alpha. Canister sampling will be conducted using USEPA Region 1 ECASOP-Canister Sampling SOP4 (08/31/07) and ASTM D5466-01 as guidance. Samples will be collected at a target sampling rate of 100 to 200 mL/min, resulting in an estimated sample collection time of less than one hour per sample (i.e., if a flow rate of 100 mL/min is used, the sampling period will be approximately 1 hour; if a flow rate of 200 mL/min is used, the sampling period will be approximately 30 minutes). The sample canister will be closed when it reaches a target final vacuum reading (typically 2 to 10 inches of mercury, to maintain a negative pressure in the canister following sample collection) rather than after a specified sample collection period.

A field replicate sample will be collected at two of the sub-slab vapor monitoring points for data validation purposes. The procedure for collection of field replicate samples is described in JCO-SOP-062 attached to the QAPP. Each field replicate sample will be collected simultaneously with the primary sample using a laboratory-supplied tee splitter and tubing from a single vapor sampling probe connected to two 6-Liter passivated canisters (SUMMA® or fused

silica lined) using the same flow controller settings. In addition, a trip blank will accompany all of the VOC samples through the entire sampling event and subsequent transport to the laboratory.

Samples will be analyzed by Alpha for the analytes listed in Table 1. Samples will be analyzed using Modified EPA Method TO-15 SIM and MA APH Method as noted in Table 1, with the target reporting limits shown in Table 1.

During the collection of both ambient air and sub-slab vapor samples, field personnel will maintain a sample log sheet summarizing the following:

- sample identification;
- date and start/stop time of sample collection;
- identity of samplers;
- sampling method(s);
- purge volume (sub-slab samples);
- canister vacuum before and after samples collected;
- canister and flow controller identification;
- ambient temperature and barometric pressure; and
- chain-of-custody used to track samples from sampling point to analysis.

6.0 DATA SYNTHESIS AND REPORTING

Analytical data generated by the analytical laboratory will be validated according to national guidelines using a Tier III data validation. The data review will include: field documentation, proper holding times, proper chain-of-custody documentation, achievement of target reporting limits, acceptable laboratory calibrations and quality control parameters, and representativeness of replicate results. The results of the data validation will be summarized in the final findings report. A table summarizing the quality control results, including any revisions or qualifiers deemed necessary, will be included.

Based on the data validation and review process described, a determination on the usability of the data will be made. Data evaluation, assessment, and response actions are described in the attached QAPP.

All data collected during the IAQA/VI work will be summarized in a tabular format and presented in the IAQA/VI findings report. Electronic tables of validated data also will be included with the findings report. The validated data will be used to evaluate the current risk exposures using a commercial worker standard consistent with relevant USEPA guidance. USEPA-proposed screening levels, provided in Attachment 1 of the February Comment Letter or by email from Joseph LeMay on March 8, 2010, except for methyl tert-butyl ether and 1,3-butadiene, which are based on the Oak Ridge National Laboratory (ORNL) Regional Screening Levels (RSLs) published by USEPA (USEPA, 2009), are included in Table 1; these values are provided solely for purposes of screening out potential vapor intrusion risks and are not appropriate substitutes for assessment or remedial end points derived from a valid site-specific risk assessment that includes realistic exposure and other assumptions (ARCADIS-US, 2010). In addition, the data will be used to address the objectives of the IAQA/VI SOW presented in Section 4.0. If additional data collection activities are necessary to support remedy design, an addendum to this SOW will be submitted for those activities.

7.0 SCHEDULE OF ACTIVITIES

A revised schedule of activities for the completion of this SOW is included as Table 3. This schedule anticipates completing the IAQA/VI SOW as soon as feasible, and assumes an expedited USEPA review and approval schedule for this revised IAQA/VI SOW. An initial PID screening of accessible building areas was conducted in February 2010. A second building inspection and PID screening was conducted in March 2010 with USEPA contractor and MassDEP representatives. It is anticipated that installation of the sub-slab vapor sampling probes will occur in early April 2010. It is anticipated that sub-slab vapor, indoor air, and outdoor air samples will be collected on the afternoon/evening of April 11, 2010 when the facility is closed to the public. Analytical data will be available approximately 15 working days after the sampling event. A summary of findings report for this IAQA/VI work will be submitted to the USEPA after validation, review, and evaluation of the sampling data are completed. If the sampling event is conducted by mid-April 2010, it is anticipated that a findings report will be submitted to the USEPA by June 18, 2010. A second round of sampling will be conducted in accordance with this SOW and QAPP. UniFirst will evaluate and discuss with

USEPA the timing of the second round of IAQA/VI sampling following completion of the first IAQA/VI sampling event.

8.0 REFERENCES

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TABLES

Table 1
Proposed Analyte List for Sub-Slab Vapor and Ambient Air Samples
UniFirst Corporation
Woburn, Massachusetts

Analyte	Analytical Method[1]	Laboratory Target Reporting Limit	USEPA-Proposed Screening Level[2]
Chloroform	TO-15 SIM	0.098 µg/m^3	0.11 µg/m^3
1,1-Dichloroethane	TO-15 SIM	0.081 µg/m^3	1.52 µg/m^3
1,2-Dichloroethane	TO-15 SIM	0.081 µg/m^3	0.094 µg/m^3
1,1-Dichloroethene	TO-15 SIM	0.079 µg/m^3	20 µg/m^3
Tetrachloroethene	TO-15 SIM	0.136 µg/m^3	0.41 µg/m^3
Trichloroethene	TO-15 SIM	0.107 µg/m^3	1.22 µg/m^3
Vinyl chloride	TO-15 SIM	0.051 µg/m^3	0.16 µg/m^3
trans-1,2-Dichloroethene	TO-15 SIM	0.079 µg/m^3	6.0 µg/m^3
cis-1,2-Dichloroethene	TO-15 SIM	0.079 µg/m^3	None (0.5 µg/m^3)
1,1,1-Trichloroethane	TO-15 SIM	0.109 µg/m^3	500 µg/m^3
Methylene chloride	TO-15 SIM	1.740 µg/m^3	5.18 µg/m^3
Carbon tetrachloride	TO-15 SIM	0.126 µg/m^3	0.16 µg/m^3
Xylenes	TO-15 SIM	0.06 µg/m^3	10 µg/m^3
Toluene	TO-15SIM	0.188 µg/m^3	500 µg/m^3
1,2-Dibromoethane (EDB)	TO-15 SIM	0.154 µg/m^3	0.0041 µg/m^3
Benzene	TO-15 SIM	0.223 µg/m^3	0.31 µg/m^3
Bromoform	TO-15 SIM	0.207 µg/m^3	2.21 µg/m^3
Ethylbenzene	TO-15 SIM	0.087 µg/m^3	0.97 µg/m^3
IsoPropylbenzene (Cumene)	TO-15 SIM	2.460 µg/m^3	40 µg/m^3
trans-1,3-Dichloropropene	TO-15 SIM	0.091 µg/m^3	0.61 µg/m^3
Naphthalene	TO-15 SIM	0.262 µg/m^3	0.072 µg/m^3
1,3-Butadiene	TO-15 SIM	0.044 µg/m^3	0.081 µg/m^3
Methyl tert-butyl ether (MTBE)	TO-15 SIM	0.072 µg/m^3	9.4 µg/m^3
1,1,2-Trichloroethane	TO-15 SIM	0.109 µg/m^3	0.15 µg/m^3
1,2,4-Trimethylbenzene	TO-15 SIM	0.098 µg/m^3	0.70 µg/m^3
1,2-Dichloropropane	TO-15 SIM	0.092 µg/m^3	0.24 µg/m^3
1,3-Dichlorobenzene	TO-15 SIM	0.12 µg/m^3	None (0.5 µg/m^3)
1,4-Dichlorobenzene	TO-15 SIM	0.12 µg/m^3	0.22 µg/m^3
Bromodichloromethane	TO-15 SIM	0.134 µg/m^3	0.066 µg/m^3
Chlorobenzene	TO-15 SIM	0.092 µg/m^3	5.0 µg/m^3
C5-C8 Aliphatic Hydrocarbons	MA APH	12 µg/m^3	63 µg/m^3
C9-C12 Aliphatic Hydrocarbons	MA APH	14 µg/m^3	10 µg/m^3

Table 1 Proposed Analyte List for Sub-Slab Vapor and Ambient Air Samples UniFirst Corporation Woburn, Massachusetts			
Analyte	**Analytical Method[1]**	**Laboratory Target Reporting Limit**	**USEPA-Proposed Screening Level[2]**
C9-C10 Aromatic Hydrocarbons	MA APH	10 µg/m^3	10 µg/m^3

Notes:

[1] Samples will be analyzed using Modified EPA Method TO-15 with Selective Ion Monitoring (SIM) and Massachusetts Air-Phase Petroleum Hydrocarbons (MA APH) Method to achieve applicable reporting limits where possible.

[2] USEPA-Proposed Screening Levels provided in Attachment 1 of the February Comment Letter or by email from Joseph LeMay on March 8, 2010, except MTBE and 1,3-butadiene, which are based on the Oak Ridge National Laboratory Regional Screening Levels (RSLs).

USEPA = United States Environmental Protection Agency Region 1

K:\1-2114-2\EPA Response 2009\Soil Vapor Response\Oct 9 Final IAQA and VI Work Plan\Revised UniFirst VI Work Plan Mar 2010\Table 1 - Analyte List.doc

Table 2 - Water-Table Monitoring Well Details
UniFirst Corporation
Woburn, Massachussets

Well	Installation Date	Well Diameter (inches)	Monitoring Point Location	MP Elevation (feet msl)	Top of Screen Elevation (feet msl)	Bottom of Screen Elevation (feet msl)	April 2009 Water Level Elevation (feet msl)	Formation Screened
S70S	NA	1.5	Top of the access plate.	69.95	54.00	39.00	57.72	UD
S71S	2/1/1985	1.5	Top of the access plate.	71.39	60.00	55.00	61.38	UD
UC10S	9/24/1992	2	Top of 2.0 inch PVC well casing.	69.482	59.60	49.60	59.39	UD
UC16	9/30/1987	6	Top of 6 inch steel well casing.	72.47	62.00	44.00	61.59	SHB
UC17	10/1/1987	6	Top of 6 inch well cover inside roadbox	73.35	62.00	44.00	65.35	SHB
UC19S	9/21/1992	2	Top of 2.0 inch PVC well casing.	70.772	64.40	54.40	61.71	UD
UC20	10/6/1987	6	Top of 6 inch steel well casing.	72.945	65.00	46.00	54.95	SHB
UC24S	9/21/1992	2	Top of 2.0 inch PVC well casing.	69.772	60.90	50.90	57.81	UD
UC25	9/23/1992	2	Top of 2.0 inch PVC well casing.	71.727	66.40	56.40	61.88	UD
UC26S	12/3/1993	2	Top of PVC well casing.	68.86	60.19	53.39	59.66	UD
UC29S	12/8/1993	2	Top of PVC well casing.	70.545	60.82	54.02	61.86 [1]	UD
UC30	12/9/1993	2	Top of PVC well casing.	73.47	64.78	58.98	61.64	UD
UC31S	12/14/1993	2	Top of PVC well casing.	69.15	58.36	52.26	59.37	UD
UC32	NA	1	Top of 1.0 inch PVC well casing.	72.62	67.47	66.82	67.30	UD
UC33	NA	1	Top of 1.0 inch PVC well casing.	72.54	62.89	62.24	64.49	UD
UC34	NA	1	Top of 1.0 inch PVC well casing.	74.06	68.91	68.26	DRY	UD
UC35	NA	1	Top of 1.0 inch PVC well casing.	73.64	66.59	65.94	DRY	UD
UC36	NA	1	Top of 1.0 inch PVC well casing.	73.76	68.11	67.46	DRY	UD
UC4	11/4/1986	2	Top of 2.0 inch PVC well casing.	73.285	64.00	54.00	67.57	SHB
UC5	11/4/1986	2	Top of 2.0 inch PVC well casing.	72.745	64.00	54.00	63.17	UD/SHB
UC6S	9/23/1992	2	Top of 2.0 inch PVC well casing.	67.355	59.50	49.50	57.72	UD
UC8	1/8/1987	4.5	Top of well casing.	73.865	69.00	54.00	69.69	UD/SHB

Abbreviations:
bgs= below ground surface
msl = above mean sea level
SHB = shallow bedrock
UD = unconsolidated desposits

Notes:
1. Water level last measured 4/26/04; data shown is from that date.

Table 3 - Expedited Schedule for IAQA/VI Assessment
UniFirst Corporation
Woburn, Massachusetts

ID #	Activity	Start Date	End Date	Task Duration	JANUARY				FEBRUARY				MARCH					APRIL				May					June			
					4-8	11-15	18-22	25-29	1-5	8-12	15-19	22-26	1-5	8-12	15-19	22-26	29-2	5-9	12-16	19-23	26-30	3-7	10-14	17-21	24-28	31-4	7-11	14-18	21-25	28-2
1	Revised *Indoor Air Quality and Vapor Intrusion Assessment Scope of Work* (IAQA/VI SOW) and Quality Assurance Project Plan (QAPP) with Standard Operating Procedures (SOPs) (IAQA/VI sampling only)	1/4	2/16	6.5 weeks																									
2	Submittal of Revised IAQA/VI SOW and QAPP to USEPA	2/17	2/17	1 day																									
3	Pre-field PID screening of accessible building areas	2/18	2/18	1 day																									
4	USEPA Comments on Revised IAQA/VI SOW and QAPP	2/25	3/8	2.5 weeks																									
5	Revisions to Revised IAQA/VI Work Plan and QAPP	2/26	3/25	4 weeks																									
6	USEPA contractor visit for PID screening and field location approval	3/15	3/15	1 day																									
7	Submittal of second Revised IAQA/VI SOW and QAPP	3/25	3/25	1 day																									
8	USEPA Approval of Revised IAQA/VI SOW and QAPP	3/25	3/31	4 days																									
9	Pre-field utility locate and points installation in building	3/31	4/9	1.5 weeks																									
10	IAQA/VI sampling field program	4/11	4/11	1 day																									
11	Laboratory sample analysis	4/12	4/30	3 weeks																									
12	Data Validation and evaluation	5/3	6/4	5 weeks																									
13	Preparation of *IAQA/VI Report of Results*	5/17	6/18	5 weeks																									
14	Submittal of *IAQA/VI Report of Results* to USEPA	6/18	6/18	1 day																									

FIGURES

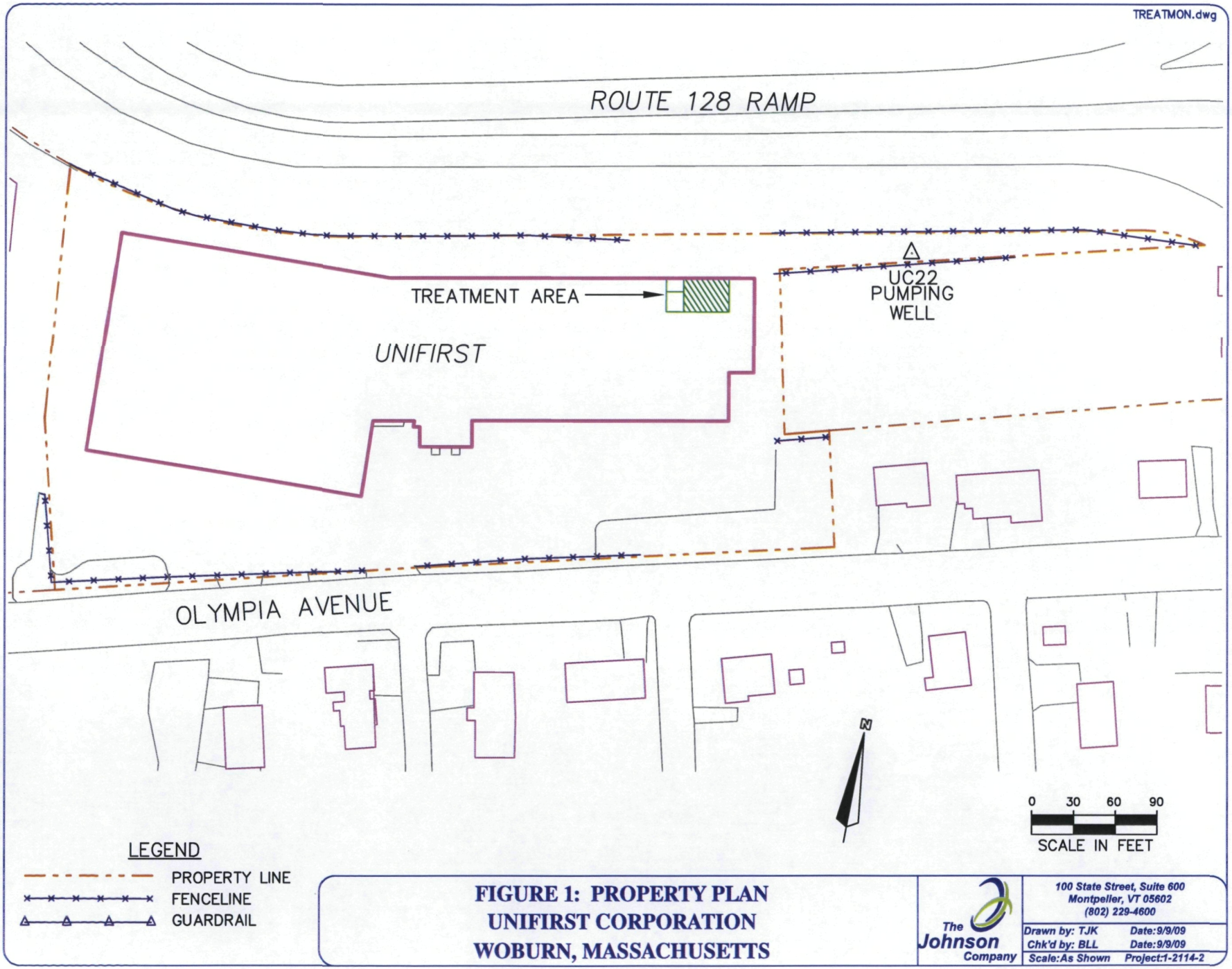
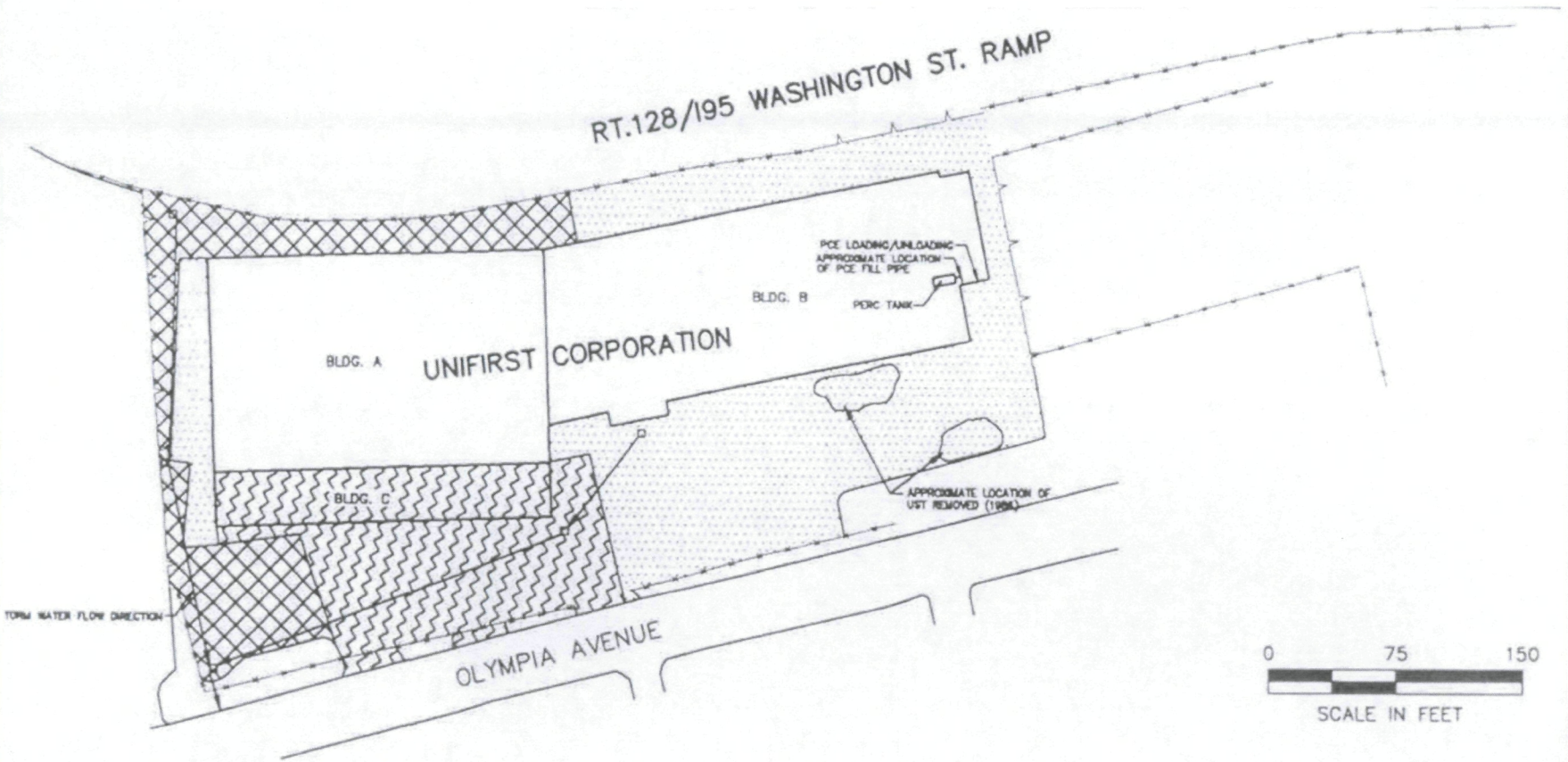


FIGURE 1: PROPERTY PLAN
UNIFIRST CORPORATION
WOBURN, MASSACHUSETTS

The Johnson Company
100 State Street, Suite 600
Montpelier, VT 05602
(802) 229-4600

Drawn by: TJK Date:9/9/09
Chk'd by: BLL Date:9/9/09
Scale:As Shown Project:1-2114-2



EXPLANATION

- PAVEMENT INSTALLED IN 1965
- PAVEMENT INSTALLED IN 1968
- PAVEMENT INSTALLED IN 1978
- CATCH BASIN, FLOW DIRECTION IN STORM DRAIN INDICATED BY ARROW.

Note: Figure reproduced from Summary of Unconsolidated-Deposits Investigation at the UniFirst Property, Woburn, Massachusetts, Applied Groundwater Research, Ltd. and Environmental Project Control, Inc., September, 1994.

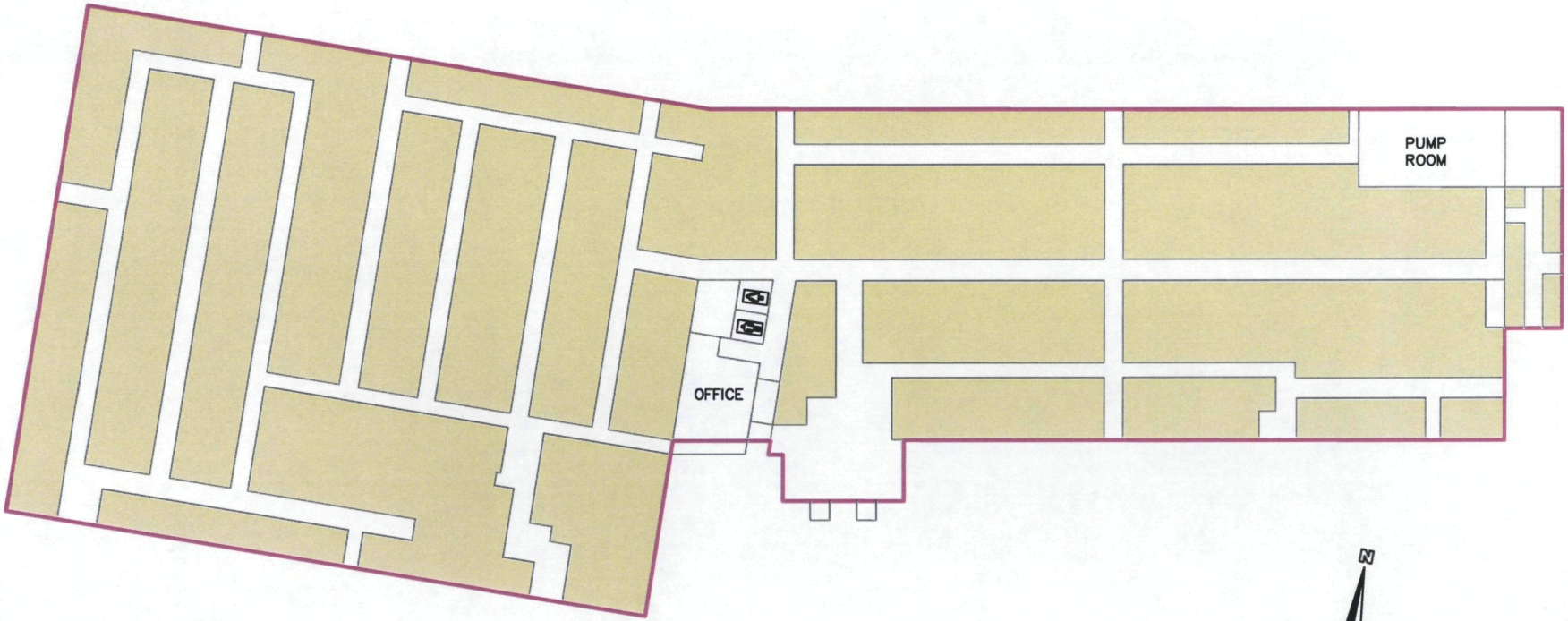
FIGURE 2: BUILDING CONSTRUCTION HISTORY
UNIFIRST CORPORATION
WOBURN, MASSACHUSETTS

Building History.apr

The Johnson Company
100 State Street, Suite 600
Montpelier, VT 05602
(802) 229-4600

Drawn by: TJK	Date: 9/9/09
Chk'd by: BLL	Date: 9/9/09
Scale: As Shown	Project: 1-2114-2

TREATMON.dwg



LEGEND

BUILDING FOOTPRINT

APPROXIMATE STORAGE AREA FOOTPRINT

(BASED ON AN UNDATED LAYOUT DRAWING OF THE EXTRA SPACE STORAGE OPERATION PROVIDED TO UNIFIRST CORP.)

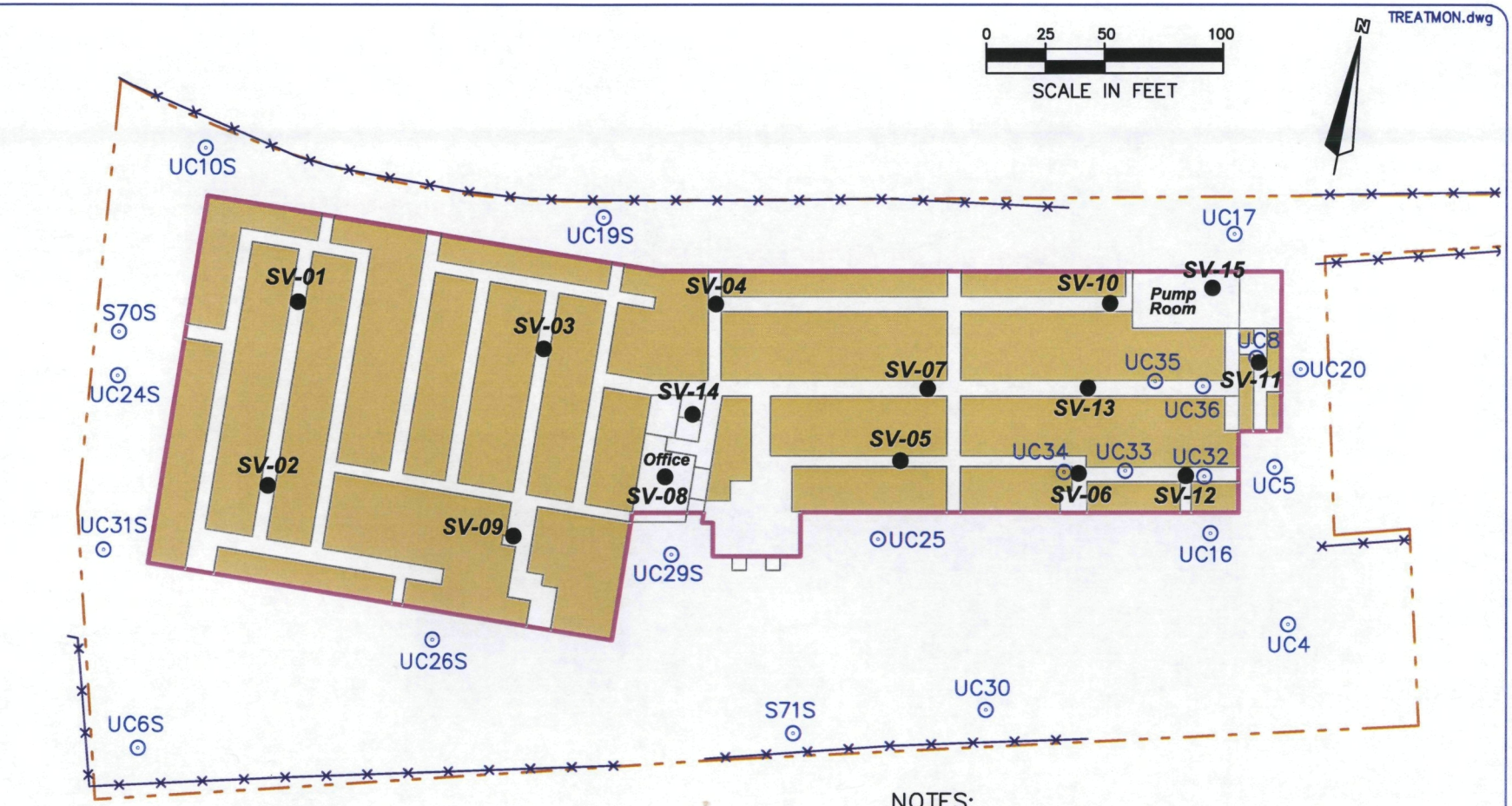
0 12.5 25 50

SCALE IN FEET

FIGURE 3: CURRENT BUILDING LAYOUT
UNIFIRST CORPORATION
WOBURN, MASSACHUSETTS

The Johnson Company
100 State Street, Suite 600
Montpelier, VT 05602
(802) 229-4600

Drawn by: TJK Date:03/22/10
Chk'd by: BLL Date:03/22/10
Scale:As Shown Project:1-2114-2



LEGEND

SV-01 ●	PROPOSED COLOCATED SUB–SLAB / INDOOR AIR VAPOR SAMPLING LOCATION [1]
UC6S ⊙	EXISTING MONITORING WELL SAMPLING LOCATION
	BUILDING FOOTPRINT
	PROPERTY BOUNDARY
	APPROXIMATE STORAGE AREA FOOTPRINT

NOTES:

1. PROPOSED SAMPLING LOCATIONS ARE APPROXIMATE AND MAY BE ADJUSTED FOLLOWING FIELD REVIEW.

SOURCES:

1. UNDATED LAYOUT DRAWING OF THE EXTRA SPACE STORAGE OPERATION PROVIDED TO UNIFIRST CORP.
2. PROPOSED SAMPLING POINT RELOCATIONS PROVIDED BY USEPA ON MARCH 24, 2010.

DRAFT

FIGURE 4: SAMPLING LOCATIONS
UNIFIRST CORPORATION
WOBURN, MASSACHUSETTS

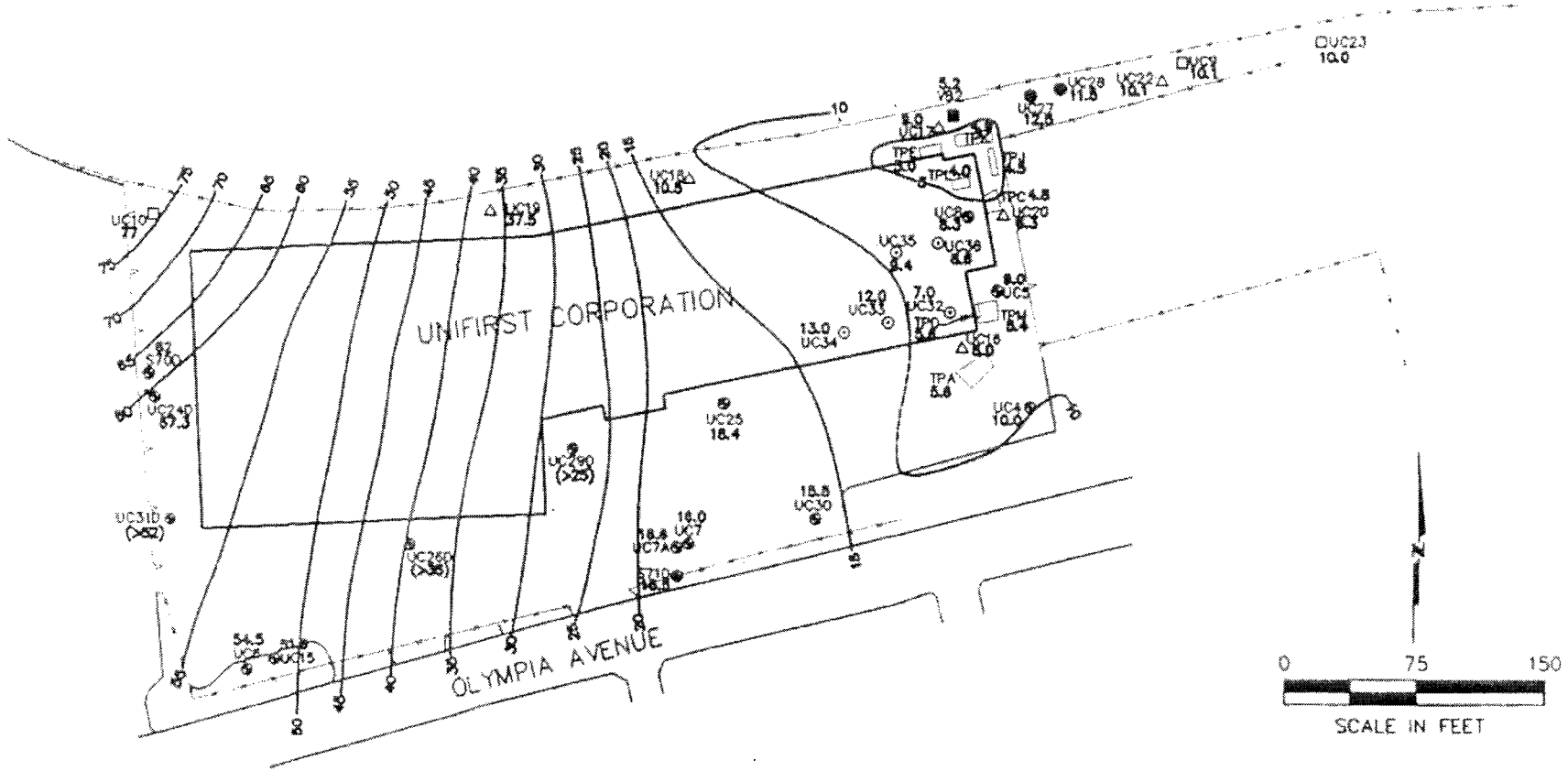
The Johnson Company
100 State Street, Suite 600
Montpelier, VT 05602
(802) 229-4600

Drawn by: TJK	Date:03/22/10
Chk'd by: BLL	Date:03/25/10
Scale:As Shown	Project:1-2114-2

APPENDIX A:

SUBSURFACE GEOLOGIC AND HYDROGEOLOGIC CONDITIONS

(Figures from Applied Groundwater Research, Ltd. and Environmental Project Control, Inc., 1994)



EXPLANATION

- TP5 TEST PIT
- □ MULTI-LEVEL BEDROCK MONITORING WELL
- ● SOIL BORING
- ⊙ 1 INCH MONITORING WELL
- ⊕ 2 INCH MONITORING WELL, S70 AND S71 ARE 1.5 INCH
- ■ VAPOR BORING (WINTER 1989)
- △ 6-INCH WELL OPEN IN ROCK; UC22 IS AN 8-INCH WELL
- + APPROXIMATE LOCATION

NOTES:

1) LOCATIONS FROM A SURVEY BY BSC GROUP OF BOSTON, MA.
2) WELL TYPES FROM DRAWINGS BY ENSR CONSULTING & ENGINEERING
3) BASE MAP PRODUCED BY GEOTRANS, INC OF HARVARD, MA. FROM AERIAL SURVEY BY COL-EAST, INC. OF NORTH ADAMS, MA.

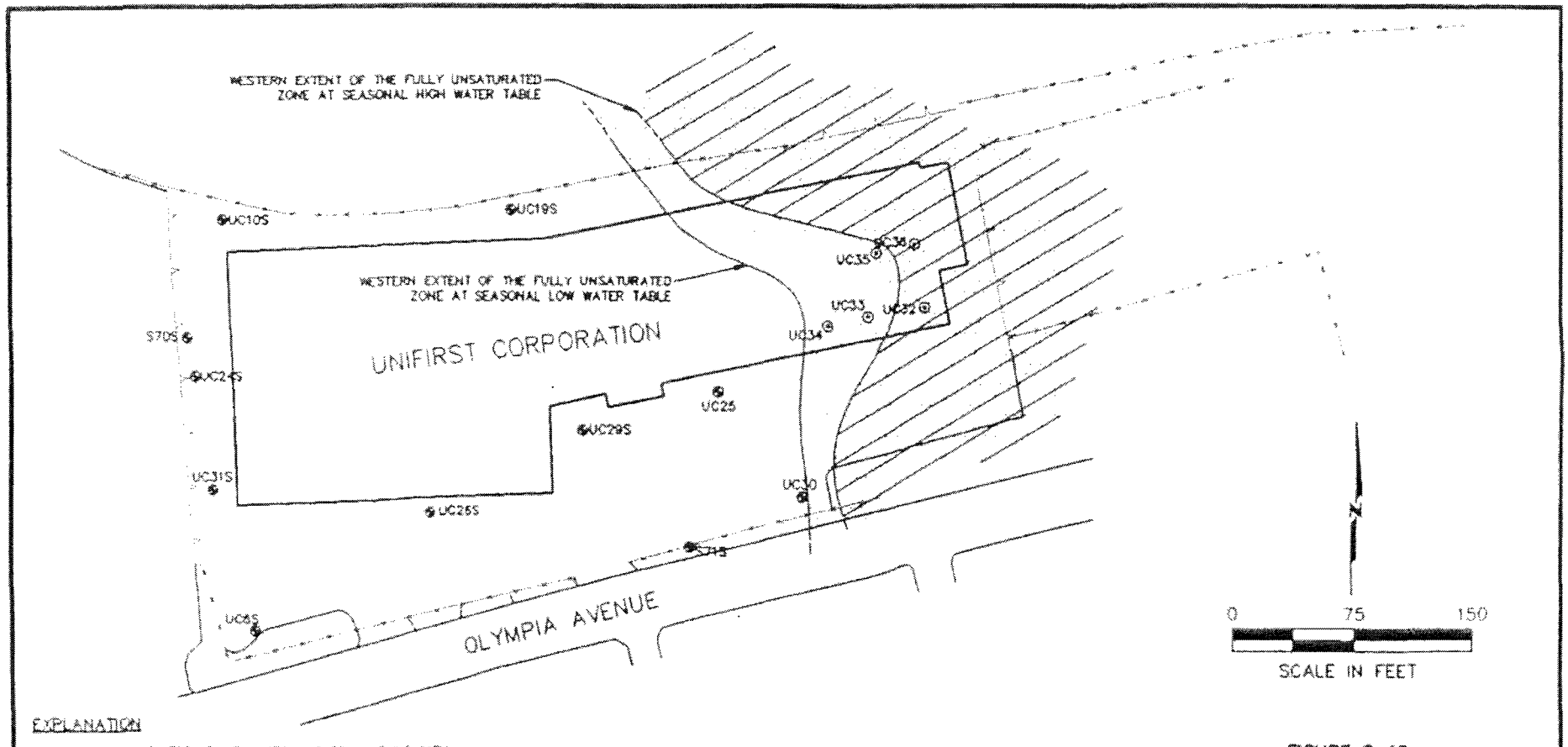
FIGURE 2-3

ENSR CONSULTING & ENGINEERING

ISOPACH OF UNCONSOLIDATED DEPOSITS
UNIFIRST PROPERTY
(THICKNESS IN FEET)

DRAWN BY:	DATE:	PROJECT NO:
M.D.F.	8/94	3140-024

3140AB78



EXPLANATION

- 2 INCH MONITORING WELL, S70 AND S71 ARE 1.5 INCH
- 1 INCH MONITORING WELL

-- 11/92

-- 5/94

NOTES:

1) LOCATIONS FROM A SURVEY BY BSC GROUP OF BOSTON, MA.
2) WELL TYPES FROM DRAWINGS BY ENSR CONSULTING & ENGINEERING
3) BASE MAP PRODUCED BY GEOTRANS, INC OF HARVARD, MA. FROM AERIAL SURVEY BY COL-EAST, INC. OF NORTH ADAMS, MA.

FIGURE 2-15

ENSR CONSULTING & ENGINEERING

EXTENT OF THE ZONE WHERE UNCONSOLIDATED DEPOSITS ARE FULLY UNSATURATED AT SEASONAL HIGH AND LOW WATER TABLE

DRAWN BY:	DATE:	PROJECT NO.
M.D.F.	8/94	3140-024

3140A93B